

# Daily GLOWBUGS

## Digest: V1 #114

via AB4EL Web Digests @ SunSITE

**Purpose: building and operating vacuum tube-based QRP rigs**

[AB4EL Ham Radio Homepage @ SunSITE](#)

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**Subject: glowbugs V1 #114**

**glowbugs**

**Wednesday, September 17 1997**

**Volume 01 : Number 114**

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Date: Tue, 16 Sep 1997 09:07:11 -0700 (MST)

From: Jeff Duntemann <jeffd@coriolis.com>

Subject: Re: 1650Kc IF Can

At 10:29 AM 9/16/97 EDT, kmlh @ juno.com wrote:

>Another option is to use a toroid xfmr and miniature Arco style trimmer  
>caps. The formulas can be found in various handbooks and QRP manuals.

We talked about this some time back (I don't even want to think how long) and it came out that toroid cores would make lousy IF transformers. The reason is that the traditional IF can gets a lot or even most of its selectivity from the degree of coupling between the two windings, which is quite loose and adjusted (slightly) by moving a core up and down inside the form. (The caps adjust the resonant frequency of the windings.)

In a toroid core, the degree of coupling between the two windings is close to 100%, because virtually all the flux that goes through one winding goes through the other as well. You won't get nearly as sharp a peak in a toroid transformer as in a can of traditional design.

Some months ago I happened upon a pi-wound RF choke with an open somewhere.

I pitched it--and regretted it later, because it would have been interesting to cut the choke (which had four windings) down the middle, clip the connection between the two windings on the intact half, fish out the four leads, and see what sort of IF transformer that would make. It wouldn't be ideal, but it might work, especially since this one had a hollow core that I might be able to stick a slug into. If anybody runs across such a choke in the future, consider doing the experiment.

The high road of course would be to clamp your hand drill in a vice, plug it into an SCR speed control, and chuck up a length of some kind of RF-friendly tubing. Pull the trigger and press the lock button. Adjust the speed to something you can cope with, and hand-scramble a winding of #40 wire into something vaguely resembling a pi. Do it again an inch down

the tubing, then put it on the bench and see what you have. I hope to try this during the winter, though I have the advantage of a lathe with back gears.

Now, you RF wizards, how's this for a crazy notion: Get a couple of good sized toroid cores (T-100 at least) and carefully crack one in half. Loop the broken one through the middle of the intact one and glue the two halves back together with super glue or something else with considerable mechanical integrity. Put one winding on each of the now-interlocked cores.

What would be the degree of coupling between the two windings? I have no clue, but I suspect it would be pretty loose. Yes?

(I know, there are mechanical problems with a lashup like this, but I'm curious to know what the magnetic properties would be.)

- --73--

- --Jeff Duntemann KG7JF  
Scottsdale, Arizona

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Date: Tue, 16 Sep 1997 12:31:00 -0700 (MST)  
From: Jeff Duntemann <jeffd@coriolis.com>  
Subject: Re: 1650Kc IF Can

At 01:24 PM 9/16/97 -0500, Roberta J. Barmore wrote:

> Your thought-experiment exists; it's an "Austin Ring" transformer, used  
> on some AM BC towers to couple the tower-lighting AC across the rather  
> high RF potential between tower & ground..  
> Never had one apart but they seemed not at all lossy; this would imply  
> that chain-linked toroid cores have pretty close coupling. Inter-winding  
> capacitance, however, is quite small..

Close coupling is not, however, good in this application. I'm intrigued by Bob Duckworth's suggestion to stack two toroids with a winding on each and vary the face-on distance between them somehow to control coupling, which could easily be varied from slim to none. (As I understand it, the flux outside the iron powder is pretty thin gruel--just what we want under these circumstances!)

Anybody ever try this? I guess the question is, Would there be \*enough\* coupling to serve as an IF transformer without also acting as a 20 dB attenuator?

This is an experiment I \*must\* perform this winter! (I have a length of threaded nylon rod that is just aching for something to do!)

- --73--

- --Jeff Duntemann KG7JF

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Date: Tue, 16 Sep 1997 17:09:51 -0400 (EDT)

**From:** leeboo@ct.net (Leon Wiltsey)  
**Subject:** tube bargains

Hi Gang

Trying to pick thru a mess of wet soggy tubes. wind blew off a section of roof at tv shop, has been a hassle. so am offering the following list of tubes in one batch, to the first one who gets back to me.. as far as I know most are new still in soggy boxes  
a total of 18 tubes for 46 plus 4 bucks for shipping. Will be offering more batches as time goes on but this is it for now. let me know by email if u are interested.

6kn6  
6jb6  
12ba7  
6ag7 2 of these  
6sn7  
12at7 (2) of these  
12bh7  
6bq5 2 also  
6cg7  
6jt6  
6kd6  
6kv6  
6lb6  
12jb6  
6cg7

THANK THE LORD FOR ALL YOU HAVE

68 yr old semidisabled senior  
(stroke got my balance & hand to eye coordination)  
ham agn as KF4RCL TECK+ (MUCH HAPPINESS)  
BUILD MOST STATION EQUIP  
SUB.BA & GB-- NO SOLID STATE

LEON B WILTSEY (Lee) tel. 941 471 3739  
4600 Lake Haven BLVD.  
Sebring, Fl. 33872 (SEBRING) WHERE THERE IS NO QRM FROM THE LOCALS

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Date: Tue, 16 Sep 1997 16:05:24 -0600

**From:** mack@mails.imed.com (Ray Mack)  
**Subject:** Re[2]: 1650Kc IF Can

<snip>

Close coupling is not, however, good in this application. I'm intrigued by Bob Duckworth's suggestion to stack two toroids with a winding on each and vary the face-on distance between them somehow to control coupling, which could easily be varied from slim to none. (As I understand it, the flux outside the iron powder is pretty thin gruel--just what we want under these circumstances!)

Anybody ever try this? I guess the question is, Would there be \*enough\* coupling to serve as an IF transformer without also acting as a 20 dB attenuator?

<snip>

Hey Y'all:

There is a circuit that simulates what you are looking for. It is called a Cohn filter. This filter is basically what is termed a coupled resonator filter.

There are 3 topologies that you are probably familiar with. The first is the crystal ladder filters that you have probably seen quite a few times in various articles and in the latest ARRL Handbooks. The next is the bottom coupled filter (uses a small common inductor) shown in the handbook for at least a decade. The other is the top coupled filter which uses a capacitor (like in the crystal filter topology). The purpose of the bottom inductor or top capacitor is to vary the coupling between the resonators. In an IF can we pretty much use the common coupling of the core/cores to provide the coupling magnetically rather than electrically.

See page 12-4 in handbooks 1985 through about 1992.

Ray Mack  
WD5IFS  
mack@mails.imed.com  
Friendswood (Houston), TX

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Date: Tue, 16 Sep 1997 17:55:06 -0400  
From: "Ornitz, Barry L" <ornitz@eastman.com>  
Subject: RE: 1650Kc IF Can

Jeff wrote:

>I'm intrigued by Bob Duckworth's suggestion to stack two toroids with a  
>winding on each and vary the face-on distance between them somehow to control  
>coupling, which could easily be varied from slim to none. (As I understand  
>it, the flux outside the iron powder is pretty thin gruel--just what we want  
>under these circumstances!)

>[Ornitz, Barry]  
>  
In the traditional IF transformer, the coupling between the two tuned circuits is by mutual inductance. It can just as easily be by capacitance. In fact, in this situation, capacitance coupling between the two toroidal windings will provide most of the coupling. A small coupling capacitance will provide a higher degree of selectivity just as a small coupling inductance.

Instead of moving the toroids closer or further apart, you might consider shielding them from each other and adjusting the selectivity with a "gimmick" capacitor between the high impedance ends of the two coils.

73, Barry L. Ornitz WA4VZQ ornitz@tricon.net,  
> ornitz@eastman.com  
>  
>

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Date: Tue, 16 Sep 1997 16:35:04 -0700  
From: Ken Lopez <kjlopez@earthlink.net>  
Subject: Re: 1650Kc IF Can

I have about fifty if cans that are new. These were purchased at a garage sale. How would I determine the operating freq? If any are 1650Kc you would be welcome to them. Is there a way to determine freq with a dip meter?

Cheers,  
Ken, N6TZV

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Date: Wed, 17 Sep 1997 10:20:49 +1000  
From: Murray Kelly <mkelly@powerup.com.au>  
Subject: Re: 1650Kc IF Can

Jeff,  
you like to do things the hard way!! :-)

.Get a couple of good  
> sized toroid cores (T-100 at least) and carefully crack one in half. Loop  
> the broken one through the middle of the intact one and glue the two halves  
> back together with super glue or something else with considerable  
> mechanical integrity. Put one winding on each of the now-interlocked cores..  
\*\*\*\*\*  
\* Murray Kelly vk4aok mkelly@powerup.com.au \*  
\* 29 Molonga Ter. / Graceville/ QLD. 4075/ Australia \*  
\* ph/fax Intl+ 61 7 3379 3307 \*  
\*\*\*\*\*

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Date: Tue, 16 Sep 1997 19:57:25 -0500 (CDT)  
From: Bob Roehrig <broehrig@admin.aurora.edu>  
Subject: Re: 1650Kc IF Can

On Tue, 16 Sep 1997, Jeff Duntemann wrote:

> Close coupling is not, however, good in this application. I'm intrigued by  
> Bob Duckworth's suggestion to stack two toroids with a winding on each and  
> vary the face-on distance between them somehow to control coupling, which  
> could easily be varied from slim to none. (As I understand it, the flux  
> outside the iron powder is pretty thin gruel--just what we want under these  
> circumstances!)

I agree that the coupling would be pretty small (probably more capacitive than anything). Maybe the thing to do is keep the 2 toroids apart and couple by means of a small link winding on each of them.

E-mail broehrig@admin.aurora.edu 73 de Bob, K9EUI  
CIS: Data / Telecom Aurora University, Aurora, IL  
630-844-4898 Fax 630-844-5530

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Date: Tue, 16 Sep 1997 21:40:17 -0700 (PDT)  
From: John Kolb <jlkolb@cts.com>  
Subject: Re: 1650Kc IF Can

On Tue, 16 Sep 1997, Jeff Duntemann wrote:

> At 10:29 AM 9/16/97 EDT, kmlh @ juno.com wrote:  
> >Another option is to use a toroid xfmr and miniature Arco style trimmer  
>  
> and it came out that toroid cores would make lousy IF transformers. The  
> reason is that the traditional IF can gets a lot or even most of its  
> selectivity from the degree of coupling between the two windings, which is

Rather than have two resonant windings on the same toroid core, sounds like the thing to do is to use two cores, with a single winding each, and top couple them with a small cap.

John Kolb KK6IL

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Date: Wed, 17 Sep 1997 10:57:34 +0200  
From: Jan Axing <janax@li.icl.se>  
Subject: Re: 1650Kc IF Can

Jeff Duntemann wrote:

Snipped a little to keep size down...

> In a toroid core, the degree of coupling between the two windings is close  
> to 100%, because virtually all the flux that goes through one winding goes  
> through the other as well. You won't get nearly as sharp a peak in a  
> toroid transformer as in a can of traditional design.

I have another idea. Take two toroids and connect a small capacitor between the hot ends of them. The capacitance determines the coupling factor. Perhaps the stray capacitance by placing the two close to each other is enough? Another way would be to connect the two cold ends and from here connect a small coil to ground. The inductance of the little coil determines the coupling. Yes? (or foot in mouth?)

> The high road of course would be to clamp your hand drill in a vice, plug  
> it into an SCR speed control, and chuck up a length of some kind of  
> RF-friendly tubing. Pull the trigger and press the lock button. Adjust  
> the speed to something you can cope with, and hand-scramble a winding of  
> #40 wire into something vaguely resembling a pi. Do it again an inch down  
> the tubing, then put it on the bench and see what you have. I hope to try  
> this during the winter, though I have the advantage of a lathe with back  
> gears.

I know a fellow ham nearby who has made an incredibly simple machine that can wind those nice looking coils found on pi chokes. Not perfect but very good. If you like, I can have a chat with him about the machine.

> Now, you RF wizards, how's this for a crazy notion: Get a couple of good  
> sized toroid cores (T-100 at least) and carefully crack one in half. Loop  
> the broken one through the middle of the intact one and glue the two halves  
> back together with super glue or something else with considerable  
> mechanical integrity. Put one winding on each of the now-interlocked cores.  
> What would be the degree of coupling between the two windings? I have no  
> clue, but I suspect it would be pretty loose. Yes?

I'll leave this for others but something tells me that you will get almost  
no coupling at all. The magnetic lines of the two cores will be perpendicular  
everywhere. Maybe some residual coupling due to stray capacitance and  
leakage inductance? Interesting idea.

Jan, SM5GNN

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Date: Wed, 17 Sep 1997 09:17:39 EDT  
From: kmlh@juno.com (kmlh @ juno.com)  
Subject: Re: 1650Kc IF Can

On Tue, 16 Sep 1997 09:07:11 -0700 (MST) Jeff Duntemann  
<jeffd@coriolis.com> writes:  
>At 10:29 AM 9/16/97 EDT, kmlh @ juno.com wrote:  
>>Another option is to use a toroid xfmr and miniature Arco style  
>trimmer  
>>caps. The formulas can be found in various handbooks and QRP manuals.  
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>reason is that the traditional IF can gets a lot or even most of its  
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>close  
>to 100%, because virtually all the flux that goes through one winding  
>goes  
>through the other as well. You won't get nearly as sharp a peak in a  
>toroid transformer as in a can of traditional design.

That was not the configuration I had in mind, but in that case you would  
be correct.

I was thinking more in the line of :

1. A xtal filter providing the selectivity and the toroid would be  
simply the impedance matching device at the input and output. I did  
something similar back around 1964 when I added another mechanical filter  
in cascade to my 75A4 and used a SS gain equalization stage. Yep; toroids  
have been around a long time.

2. Use the toroids in a bandpass filter as the primary selectivity determining element. I didn't run the filter program on this so not sure of the insertion losses required for a say 20KHz bandwidth at 1650KHz.

3. Use 2 toroids in a pseudo IF transformer. The coupling and therefore the selectivity would be determined by the value of the capacitor between them.

None of the above were meant to supercede the traditional IF can but are simply alternatives if nothing else is available. It would also be interesting to measure the Q of a pi-wound coil and a toroid configuration.

73 Carl KM1H

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Date: Wed, 17 Sep 1997 09:27:27 EDT  
From: kmlh@juno.com (kmlh @ juno.com)  
Subject: Re: 1650Kc IF Can

On Tue, 16 Sep 1997 21:40:17 -0700 (PDT) John Kolb <jlkolb@cts.com> writes:

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>Rather than have two resonant windings on the same toroid core, sounds

>like the thing to do is to use two cores, with a single winding each,

>and top couple them with a small cap.

>

>John Kolb KK6IL

Absolutely correct John. I replied earlier today to the above but I now have a number of messages suggesting the capacitive coupling so sorry all for the duplication.

73 Carl KM1H

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Date: Wed, 17 Sep 1997 08:38:39 -0600 (MDT)  
From: Art Winterbauer <art@comet.ucar.edu>  
Subject: Classic Radio Exchange: 6L6 date?

If I get the chance I'm going to participate in the Classic Radio Exchange (the 28th I believe). One question and a comment:

\* I'll be using a two-step regen receiver (#30 tubes). The article I



built this radio from was reprinting a 1928 article from QST, so I guess I'll figure 1928 in computing the multiplier. But the transmitter is just a xtal-controlled 6L6 one-tube transmitter. What would be a good date to affix to this?

\* When using the regen with this 6L6 (a mighty 7 watts out on 80 and 40), the receiver's regen control needs to be re-adjusted after transmitting. That means the station I'm in QSO with is somewhere else on the dial and must be re-located. I'd tried shorter antennas, switching out the antenna, even switching off the plates while transmitting, all to no avail. About half the time, the regen control gets upset after being subjected to the mighty signal from the tx (even when the plates were switched out). So, I've pressed into service an old Jackson signal generator. It's set to generate a very weak but audible signal a few Khz above or below the frequency (but not on the frequency). When readjusting the regen control, I do a quick search for this signal then move up or down to find the other guy. Works pretty well!

- --Art WA5OES

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Date: Wed, 17 Sep 1997 16:56:34 -0500  
**From:** Conard Murray <cfm5723@ntech.edu>  
**Subject:** Call for GB topics

Hello gals and guys,  
I would really like to see some organized activity within the GB community this winter. How about a topic for each month from October to March? Something like October is regen receiver month followed by November as self-excited Hartley month ... these are just examples ..... I want suggestions from everyone.  
During each month those interested will attempt to build and operate an example of the featured circuit with the help and encouragement of the entire list. Maybe some interested parties will volunteer to sponsor a circuit type and offer a prize to the top performer ...?  
If this works out like I want it to we will get some great discussion going on a new topic every month as well as some great operating experiences ..... that's what it's all about, right?  
What'cha all think?  
73,  
ZUT,  
de Conard WS4S

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End of glowbugs V1 #114  
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Created by **Steve Modena, AB4EL**  
Comments and suggestions to **[modena@SunSITE.unc.edu](mailto:modena@SunSITE.unc.edu)**

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